

SOME *HELICOPSYCHE* VON SIEBOLD SPECIES FROM  
CUBA AND HISPANIOLA WITH CONSPICUOUS ANDROCONIAL  
SYSTEMS (INSECTA: TRICHOPTERA: HELICOPSYCHIDAE)

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*Abstract.*—Two new species, *Helicopsyche altercoma* from the Dominican Republic and *H. sigillata* from Cuba, are described and figured, the Cuban *H. comosa* Kingsolver is redescribed and figured as is the female lectotype of *H. lutea* (Hagen) from the Dominican Republic. Androconial structures are found on the male gonopods of *comosa*, on the underside of the forewings and male gonopods of *altercoma*, and on the underside of the forewings only in *sigillata*.

*Key Words:* caddisfly, Cuba, Dominican Republic, new species, androconial organs, systematics

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*Helicopsyche comosa* Kingsolver (1964) was described from Cuba and was characterized by possessing peculiar, extremely long, hair tufts on the gonopods. Since then, collections have been made of several *Helicopsyche* species from Cuba and the Dominican Republic either bearing such long hair tufts, or with wing androconia, or both; but, excepting a few brief mentions, none of these unusual insects were described. These species and their remarkable structures are here described. The material used for this study is kept in either the National Museum of Natural History (NMNH), Smithsonian Institution, Washington, DC, USA, in the Zoological Museum of the University of Amsterdam (ZMA), Amsterdam, The Netherlands, or in the Museum of Comparative Zoology (MCZ), Harvard University, Cambridge, MA, USA.

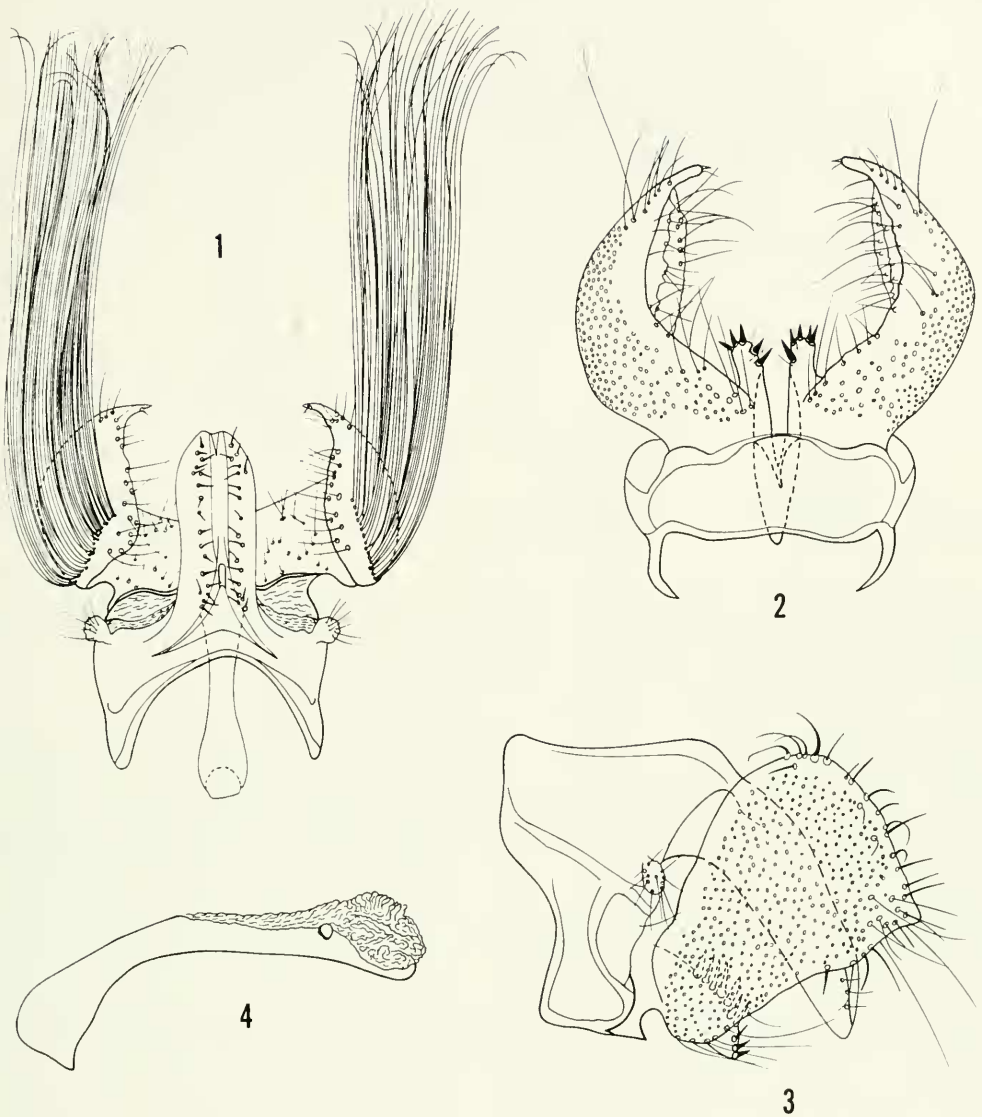
*Helicopsyche comosa* Kingsolver  
Figs. 1-7

*Helicopsyche comosa* Kingsolver, 1964: 259.

Material examined.—Cuba, Pinar del Río Province: Soroa, Río el Manantiales, 3 May

1973, L. Botosaneanu, 13 ♂ (alcohol, ZMA); Soroa, 27-28 April 1983, W. N. Mathis, 2 ♂ (pinned, NMNH); "Cuba Ch. Wright" (no other details, but specimens almost certainly from Pinar del Río), 3 ♂ (pinned, MCZ). The type (not examined) is from "Aspiro-Rangel, Pinar del Río Province."

Male.—Length of forewing, 5-5.9 mm. Wings devoid of androconia. Abdominal sternites III and IV with well-developed reticulation; sternite V with very feeble reticulation; sternite VI with relatively long, straight appendage, apically slightly widened and blunt; sternite VII unmodified. Sternite IX in lateral view with short, but distinct, pointed projection posteriad (this projection is the lateral aspect of what looks like two rounded posteromedial lobes in ventral view). Segment X hood-like in lateral view, apically tapering (lateral and dorsal view), with slight apicomeral emargination, with an irregular, longitudinal row of short setae. Gonopod large, broad, in lateral view more than twice as broad distally than basally, ventral margin sinuous, apex

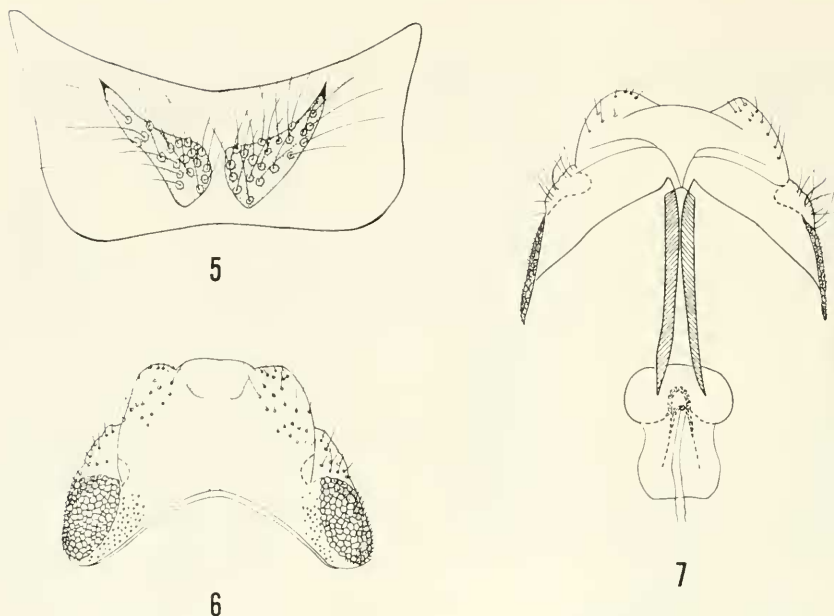


Figs. 1-4. Male genitalia of *Helicopsyche comosa* Kingsolver. 1, dorsal. 2, sternite IX and gonopods (gonopodial penicillus not represented), ventral. 3, lateral (gonopodial penicillus not represented). 4, phallic apparatus, lateral.

slender, digitate, turned mediad; internal face with strongly developed relief; basomesal lobe in lateral aspect slightly and triangularly projecting beyond dorsolateral lobe, in ventral view relatively slender, parallel-sided, with several stout spines apically and preapically. Most of lateral face of gonopod bearing extremely long, silky (coppery-reddish) setae, about three times longer than the gonopod itself (it is not possible

to distinguish different types of setae in these brushes).

Female.—The following description and illustrations (Figs. 5-7) were prepared from specimens from Soroa (in alcohol, collected by L.B. on 3 May 1973, and provisionally determined by the late H. H. Ross as *comosa* females). This association should be considered tentative, because at this locality females of at least two species were caught



Figs. 5-7. *Helicopsyche comosa* Kingsolver, female (association tentative). 5, sternite VII. 6, 7, genitalia, dorsal and ventral.

together. Length of forewing: 5.8–6.8 mm. Sternites III and IV with very well developed reticulation; appendage on sternite VI, oblique, pointed, about  $\frac{1}{2}$  length of its sternite (if all female specimens available from Soroa are considered, the length of this appendage varies greatly). Middle of sternite VII, very distinct, oblique, triangular sclerotizations, bearing numerous fine setae with large alveolae (in some specimens these two sclerites may be fused along the median line); proximally to these sclerites there is sometimes another, darker zone, but never so distinctly delineated as in *H. altercoma* n. sp. (see below). Middle of sternite VIII with large, roughly triangular, darker sclerite. Spermathecal “neck” slender, distinctly longer than spermatheca itself.

*Helicopsyche altercoma*,

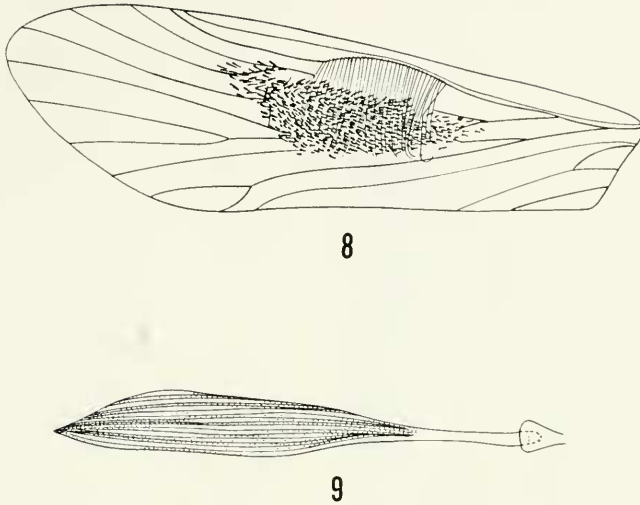
NEW SPECIES

(Figs. 8–16)

Material examined.—Dominican Republic, Dajabón Province: Río Massacre, Balneario El Salto, Loma de Cabrera, 222 m,

24–25 May 1973, D. & M. Davis: male holotype (alcohol, NMNH). La Estrelleta Province: 4 km SE Río Limpio, 760 m, 24–25 May 1973, D. & M. Davis: female allotype, 1 ♂, 4 ♀ paratypes (alcohol, NMNH). La Vega Province: Constanza, 21 Aug. 38, 3–4000 ft, Darlington: 1 ♀ paratype (pinned, MCZ); Convento, 12 km S of Constanza, 6–13 June 1969, O. S. Flint, Jr., & J. Gomez: 1 ♂, 1 ♀ paratypes (pinned, ZMA & NMNH); Jarabacoa, 3–4 June 1969, O. S. Flint, Jr., & J. Gomez: 1 ♂, 18 ♀ paratypes (pinned, NMNH); Río Camú, 19 km NE Jarabacoa, 12 June 1969, O. S. Flint, Jr., & J. Gomez: 1 ♀ paratype (pinned, NMNH); Jarabacoa, blacklight at Río Jimenoa, 13 Nov. 1984, P. J. & P. M. Spangler, R. Faitoute: 7 ♀ paratypes (alcohol, NMNH); La Palma, 12 km E of El Río, 2–13 June 1969, O. S. Flint, Jr., & J. Gomez: 1 ♀ paratype (pinned, ZMA). Location unknown: “S. Francisco Mts [San Francisco] St. Domingo, W.I., Sept 1905” [coll. August Busck]: 1 ♂ paratype (pinned, NMNH).

Male.—Length of forewing: 4–4.9 mm



Figs. 8, 9. *Helicopsyche altercoma*, n. sp., male. 8, forewing (inferior face). 9, strongly enlarged androconium.

(smaller than *comosa*). Forewing centrally on its inferior face, with very large patch (between  $R_2$  and  $M_4$ ) covered with black androconia; these androconia foliaceous, elongate, rather narrow, with longitudinal ribs and relatively strong but short petioles; the black androconial patches, not located in pockets or pouches, are easily seen with the naked eye; central, sinuous part of  $R_1$ , with long row of very fine, long, relatively stiff setae, whose tips often curled, and directed towards androconial field. Interestingly, there is no difference which could be described in the male genitalia, or in the sternal reticulation, between *altercoma* and *comosa*: the description given for the latter species applies almost perfectly to *altercoma* (of course, slight differences in the observational angle may result in strongly different aspects; this is, for instance, the case with the gonopods in ventral view—Figs. 2 and 12—or in lateral view—Figs. 3 and 11). It is possible that segment X in dorsal view has a somewhat broader apex, with less distinct apicomeseal incision, and with tufts of apical spines; moreover, there seems to be a slight difference in the shape of the median part of the posterior border of sternite IX.

Female.—Length of forewing of allotype: 5.7 mm. Sternite III with well developed

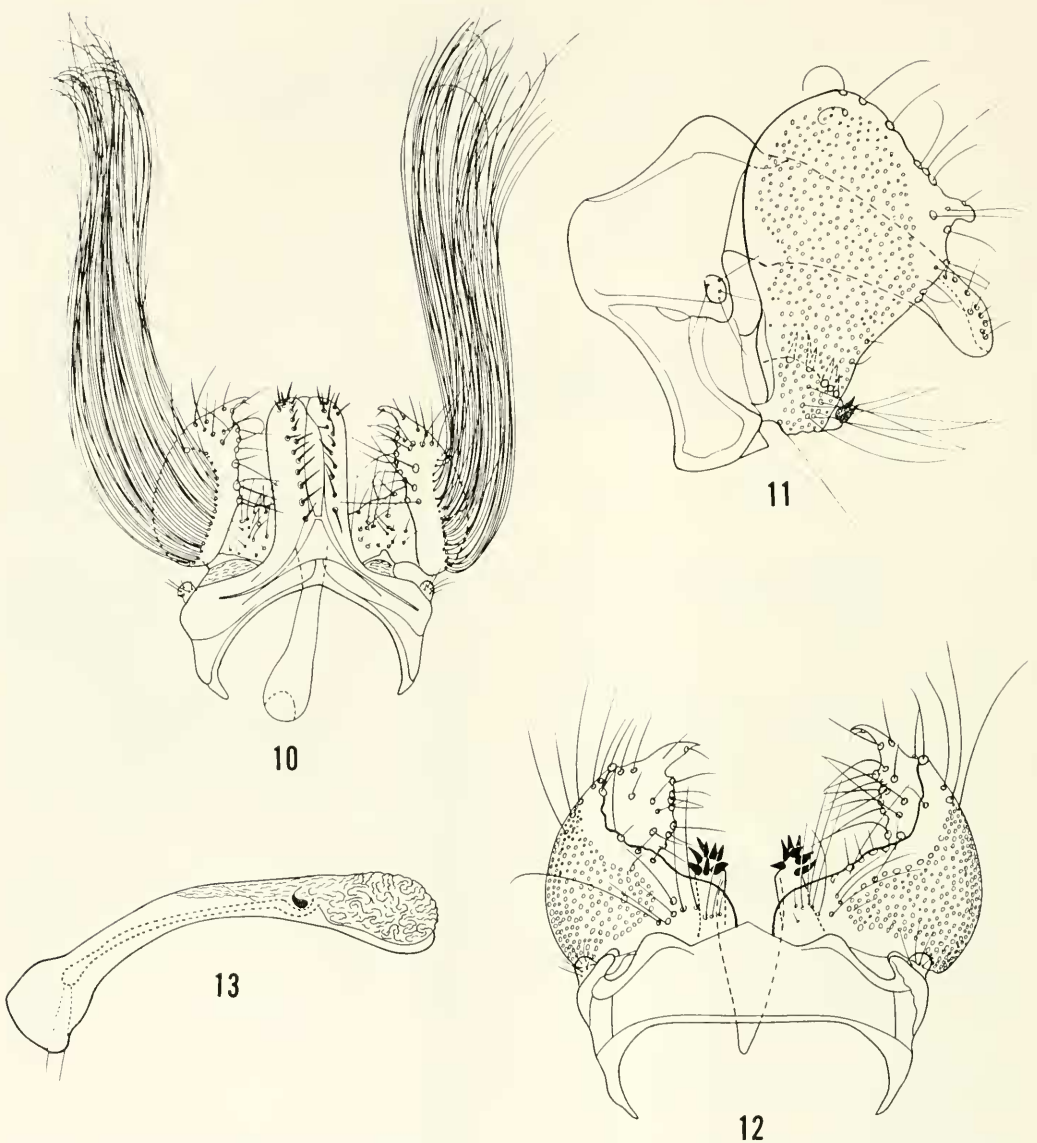
reticulation, but forming only relatively short transverse belt; sternite IV also with well developed reticulation, also forming transverse belt, but clearly more developed lengthwise; sternite V with much less developed reticulation; appendage of sternite VI pointed, extremely variable in length. Sternite VII with characteristic sclerotizations: pair of posterior, oblique sclerites, basally relatively narrow, tapering to apical points, with relatively few setae with large, distinct alveolae; proximally to these oblique sclerites, another pair of distinct, transverse sclerites with irregular limits. Spermathecal “neck” about as long as the spermatheca itself, relatively broad, especially proximally where it is two times broader than at its distal end.

Derivatio nominis.—The specific name was coined from Latin “altera” (the other) and “coma” (mane).

*Helicopsyche* near *comosa* Kingsolver

*Helicopsyche* near *comosa* Kingsolver.—  
Botosaneanu, 1977: 233; 1979: 37, 53.

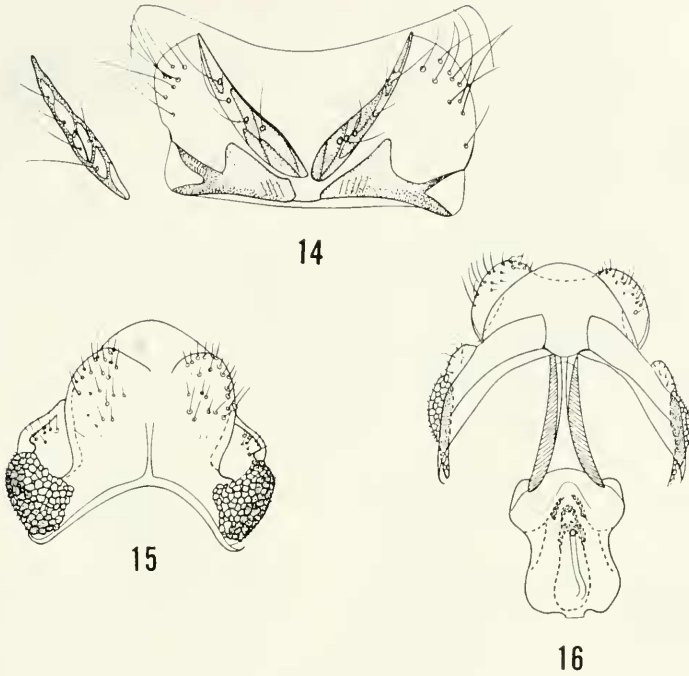
In two publications mention was made of a *Helicopsyche* certainly near *comosa*, but apparently distinct from it. The male had the very long brushes of setae on the gon-



Figs. 10-13. Male genitalia of *Helicopsyche altercoma*, n. sp. 10, dorsal. 11, lateral (gonopodial penicillus not represented). 12, sternite IX and gonopods at slightly different angle from that in Fig. 2 (gonopodial penicillus not represented), ventral. 13, phallic apparatus, lateral.

opods, but unfortunately, never was mention made as to the presence or absence of an androconial patch on the forewings. A male and two females of this species were caught on 22 Feb 1973 (L. Botosaneanu coll.)

at the Río Sabanilla, a tributary of the Río Miel, 6 km south of Baracoa, near the eastern end of Cuba. This interesting male specimen, sent long ago for study to the late H. H. Ross, was not returned to L. Botosa-



Figs. 14–16. *Helicopsyche altercoma*, n. sp., female. 14, sternite VII, and another view of one of the posterior sclerites. 15, 16, genitalia, dorsal and ventral.

neanu after Ross' death, and must be considered as lost. We are thus unable to determine if the *Helicopsyche* near *comosa* from Oriente is a distinct species or *H. altercoma*, n. sp.

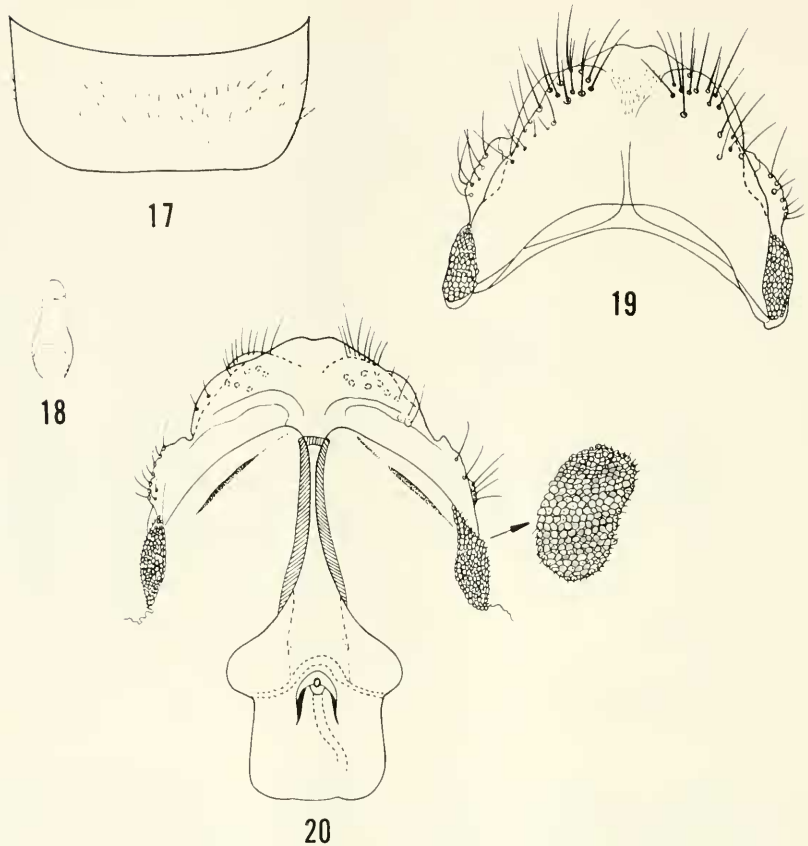
*Helicopsyche lutea* (Hagen)  
(Figs. 17–20)

*Notidobia lutea* Hagen, 1861: 271.—Ross, 1952: 35 [lectotype].

*Helicopsyche lutea* (Hagen).—Hagen, 1866: 254 [to *Helicopsyche*, Haiti].—Fischer, 1970: 299 [bibliography].—Flint, 1967: 24.

This species was described from “St. Domingo,” the old name for the Island of Hispaniola (also the name for the capital of the Dominican Republic). Hagen later recorded it from Haiti not mentioning St. Domingo; there is no basis for Haiti on the specimen labels or in any other published data and we conclude it was a lapsus on his part for

Santo Domingo. Heretofore, no illustration of the species has been published. The lectotype, designated by Ross, is a female; this specimen was studied (together with another specimen from Hagen's syntypic series, also a female; both pinned and in the MCZ) and its genitalia are here figured. Flint (1967) suggested that *lutea* is identical with the Cuban *comosa*, a possibility we now believe unlikely. The female genitalia of *lutea* apparently differs in several respects from that of *altercoma*, but one difference seems to be decisive: sternite VII in *lutea* is extremely simple (Fig. 17), without any of the darker sclerites found in *altercoma* (Fig. 14). The conclusion is that *lutea* cannot be the female of one of the presently known species in the “*comosa* group.” A few other details on the female lectotype are here noted: length of forewing about 5 mm; setae on both wings golden, perhaps with very faint reddish tinge; antennae distinctly crenate, segments brown,



Figs. 17–20. Female lectotype of *Helicopsyche lutea* Hagen. 17, sternite VII. 18, appendage of sternite VI. 19, 20, genitalia, dorsal and ventral (arrow pointing to lateral view of one of the alveolar patches with sensillae).

articulations yellow; head dorsally, pro- and mesonotum, entirely yellow.

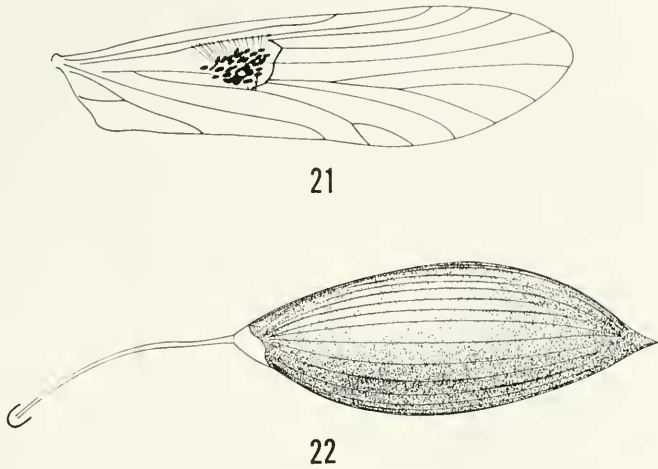
***Helicopsyche sigillata*,**

NEW SPECIES

(Figs. 21–28)

Material examined.—Cuba, Oriente Province: Baracoa, Monte Iberia, 22 Dec. 1977, N. Novoa: male holotype, female allotype (both in ZMA), 5 ♂, 3 ♀ paratypes (all in alcohol, NMNH & ZMA); Baracoa, Monte Iberia, Nibujón [approximately 20°31'N, 74°39'W], March 1972, L. Armas: 5 ♂, 1 ♀ paratypes (alcohol, ZMA). Monte Iberia is a meseta, isolated and strongly forested, near Baracoa, at the eastern end of Cuba.

Male.—Length of forewing: 3–3.5 mm. Very small and very pale species. On inferior side of forewing, at distal part of proximal third, with relatively well delimited (distally through the anastomosis) pocket containing ca. 50 androconia; these seed-like (not very flat), strongly pointed apically, with longitudinal ribs, with long and very delicate, flexible petioles; most very dark, but, under a certain light, some golden. The androconial patches visible to the naked eye. Sternite III with loose reticular structure; sternite IV with very faint, feebly developed reticular structure; no dark, strong sclerites nor appendages on the following sternites. Segment X in lateral view strong, with truncated apex. Gonopod rather broad (about



Figs. 21, 22. *Helicopsyche sigillata*, n. sp., male. 21, forewing (inferior face). 22, strongly enlarged androconium.

two times broader at its distal margin than at its base); apical angle appearing bluntly rounded in perfectly lateral aspect, but produced into sharp, mesally-directed beak from posterior aspect; in ventral view the gonopods are especially slender, their parallel-sided basomesal lobes well separated from lateral lobes, with subapical seta on internal margin and some stout apical spines.

Female.—Length of forewing: 3.6–3.7 mm. Sternite III with well-developed, transverse, reticulate belt; sternite IV with less well developed reticulation; no appendage from sternite VI; sternite VII with a characteristic sclerite (Fig. 28), difficult to discern in pale specimens. Spermatheca with sinuous lateral margins, distal lobes not strongly produced laterally, spermathecal “neck” shorter than spermatheca itself, especially broad at proximal end.

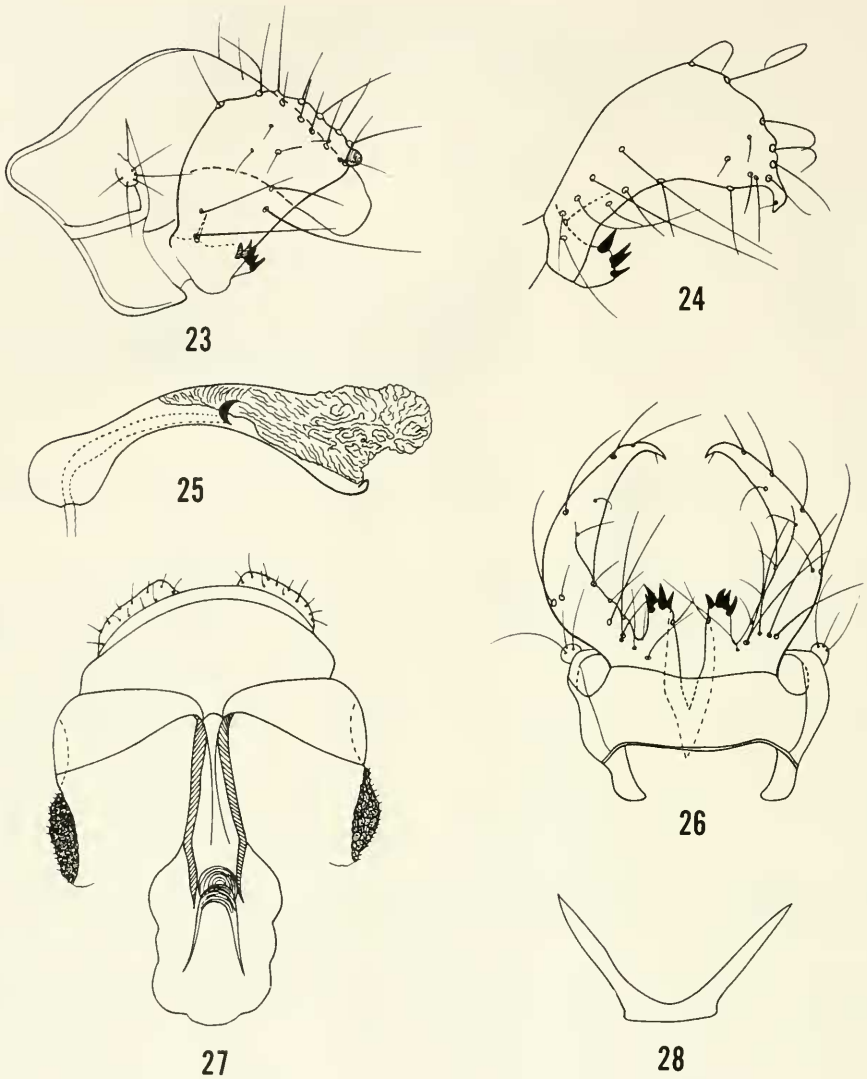
Derivatio nominis.—From Latin “sigillatus” (sealed), alluding to the androconial patch looking like a seal.

#### DISCUSSION

Androconial organs, i.e. specialized cuticular structures often connected to glandular cells, are known in rather many male Trichoptera belonging to different families. Nevertheless, the case of *Helicopsyche al-*

*tercoma* is particularly interesting, because we have here two types of co-adapted androconial organs: alar organs (androconia, and very probably also glandular cells and organs—which we were unable to see with the optical microscope) and abdominal organs (large brushes of setae inserted on the gonopods). Two types of co-adapted androconial organs are very frequent in butterflies and moths (Vane-Wright and Ackery 1984, Birch et al. 1990). For instance, such organs are almost universally present in the butterfly subfamily Danainae, where excellent evidence exists that the abdominal pencils disseminate during courtship “pheromone transfer particles” produced in glands located under the alar androconial organs. For dispersal, mechanical contacts are established between the hair pencils and the alar organs—these last being only of “indirect” function (see for instance, the study by Boppré and Vane-Wright 1989, from which we take most of the information on Danainae). Nevertheless, it must be mentioned that in Danainae the alar organs are mostly on the hindwings, whereas the abdominal pencils are extrusible and normally retracted within the abdomen. Such “pairs of androconial organs developed in different parts of the body and requiring special behav-





Figs. 23–28. Male (23–26) and female (27, 28) genitalia of *Helicopsyche sigillata*, n. sp. 23, lateral. 24, gonopod, lateral, under a different angle. 25, phallic apparatus, lateral. 26, sternite IX and gonopods, ventral. 27, female genitalia, ventral. 28, sclerite of female sternite VII.

itorial activity to make functionally necessary mechanical contacts are called *binate organs*” (in Trichoptera, besides *H. altercoma*, such a case may be that of *Oecetis maspeluda* Botosaneanu, from Cuba and Isla de Pinos). Whereas “pairs of organs which unavoidably make contact by virtue of their respective anatomical positions” are called dual organs (in Trichoptera, a typical case

being that of all known species of the Neotropical and Antillean genus *Amphoropsyche* Holzenthal).

The case of *H. comosa* is different: the gonopodial penicillia are developed exactly as in *H. altercoma*, but alar organs are absent — this being the unique conspicuous difference between the males of the two sister species. The question may be asked: what

may be the function of gonopodial penicillia in the absence of alar organs? This is exactly the case of a few *Danainae*, where the presence of some "alternative system" on the abdomen is considered as possible.

In *H. sigillata*, we have the relatively simple case of a well developed wing organ in the absence of abdominal—or other—brushes of setae. An interesting peculiarity shared by the probably not closely related species *H. altercoma* and *H. sigillata*, is the insertion on the section of  $R_1$  facing the alar organ of a row of fine, relatively stiff setae clearly directed to this organ: we know nothing about its function, but this may be stimulation of pheromone, or pheromone-transfer-particle, production.

The evolutionary implications of the presence of various androconial systems in several *Helicopsyche* from Cuba and Hispaniola, are certainly important. Of course, we have here also complex "specific mate recognition systems" (Paterson 1985).

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